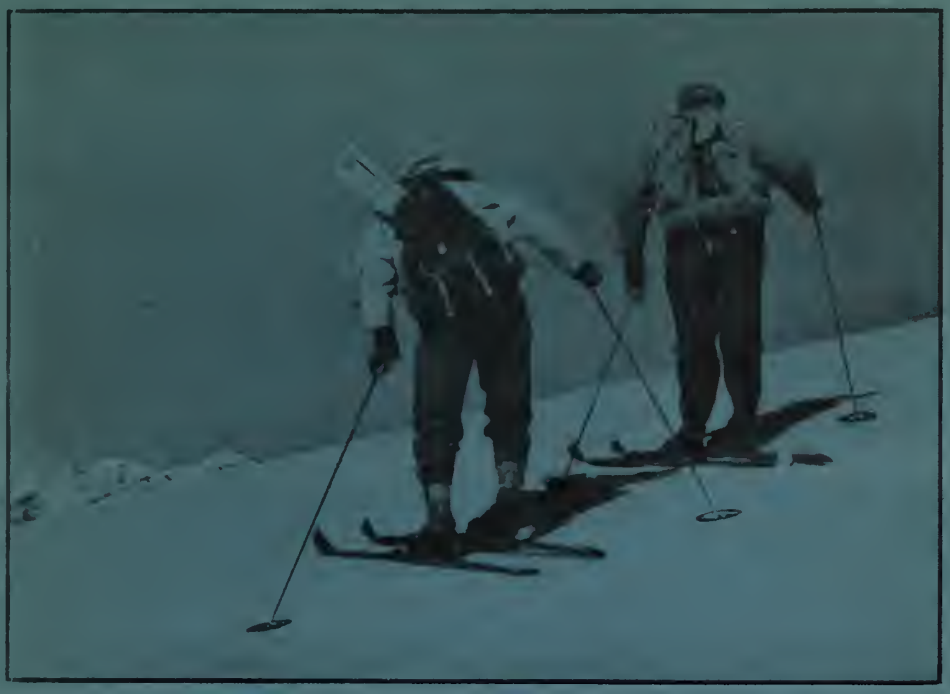

Snow Surveyors Climbing to a Snow Course

FEDERAL-STATE COOPERATIVE SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

RIO GRANDE DRAINAGE BASIN

MARCH 1, 1946

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado and New Mexico and other Federal, State and local organizations.

March 1, 1946

WATER SUPPLY OUTLOOK

RIO GRANDE

The irrigation water supply prospects for the Rio Grande have not improved during the past month and still remain unfavorable. Snow cover in high mountains is less than normal and there is little or none at the lower elevations, both in the San Luis Valley and northern New Mexico. Reservoir storage improved during the past month but is still below normal. Storage in Elephant Butte is normal and in El Vado it is about the same as last year. The outlook for the Chama, Pecos and Canadian continues to be disappointing at this time. Precipitation was below normal in all areas. Soil moisture is poor to fair. Crop and range conditions are only fair.

RIO GRANDE: Snow conditions over the mountain watershed of this stream, covering northern New Mexico and the San Luis valley, improved very little during the month of February. The present average water content of the snow is 3.3 inches as compared with 8.8 inches a year ago at this time. The 10-year average is 7.7. The snow on the headwaters of the tributary streams in northern New Mexico, Red River and Rio Chama, has an average water content now of only 3.3 inches as compared with 10.1 a year ago. Generally over the whole drainage the water content averages about 40 percent of the amount March first last year. Because of the deficiency in precipitation during the past several months, and lack of snow at the lower elevations, the winter stream flow has been below normal. The runoff however, has been enough to provide about 4,000 acre-feet of additional storage in the San Luis Valley reservoirs during February, bringing the total to 41,000 as compared with 69,300 a year ago. The Elephant Butte and Caballo reservoirs, combined, now hold 1,337,000 acre-feet, last year the storage was 1,555,700. For the entire drainage area of the Rio Grande the reservoir storage is fairly good and it can be confidently expected that some additional filling will be realized before the melting season is reached. Soil moisture throughout the irrigated areas is poor.

The present outlook for the coming season's irrigation water supply is now less favorable than it was a month ago. Because of the deficiency of precipitation the mountain soil is dry and for this reason a measurable portion of the water from the melting snow will be absorbed as recharge. This will reduce the runoff very appreciably. If the drought persists during the coming months the prospects for an adequate water supply this coming summer will be very poor. Since, however, a single good storm can materially change the picture, the present unfavorable situation should not be viewed with undue alarm.

CHAMA RIVER: The several snow surveys recently made on this drainage indicate, on the average, only a small increase in the water content

during the past month. On Cumbres Pass, elevation 10,000, where under usual winter conditions the precipitation approximates a normal of 5 inches during the month of February, the water content of the snow increased about 1 inch. On the Chamita snow course, 5 miles north of thetown of Chama, the depth of snow during the past month was reduced from 15 to 11 inches with a loss in the water content from 3.3 to 2.6 inches. This course has an elevation of 8,500 feet. Melting snow cover at lower elevations apparently is keeping the river at a fair stage. During the past month the El Vado Reservoir has gained 3,100 acre-feet bringing the storage to 90,400 acre-feet which is 40 percent of capacity. During February 1945 the gain in storage was likewise 3,100. Last year the storage was 92,900. During the coming weeks additional storage will be realized.

Should there be continued deficiency in precipitation during the remainder of the winter and early spring a very disappointing runoff is to be expected. However, since there will be substantial amount of water in El Vado by mid June there is at this time no reason for alarm as to a serious water shortage in the lower valley served by this water supply.

PECOS RIVER: The snow cover on the headwaters of this stream still remains subnormal. The Panchuela snow course, near Cowles, suffered a loss of 0.6 inch in the water content of the snow during February. This course is relatively low in elevation, only 8,300 feet. The depletion in the water content appears to indicate the melting of snow at the lower elevations and the strengthening of the stream flow at this season of the year. The general water supply outlook at this time is somewhat more discouraging than it was a month ago. The present snow condition and the continued subnormal precipitation dulls the prospect for an adequate runoff this season.

CANADIAN

For this drainage the present average water content of the snow is 2.7 inches, which is only 0.2 inch more than it was a month ago. At Hematite Park the snow lost in water content during the past month. The runoff prospects at this time, as based on snow, are not bright and unless above normal snow occurs in the mountains during the coming weeks a shortage in water supply can be expected. Present soil moisture conditions in the Tucumcari area are reported as subnormal. Stream flow is below normal and the range and crop conditions are poor to fair. At this time there is no snow in this area. In the Conchas Reservoir, however, is now stored 341,500 acre-feet of water which is essentially identical with that of a year ago at this time.

* * *

Throughout the areas on the headwaters of the several main streams in New Mexico, and the Rio Grande in the San Luis Valley, the snow cover ranges from 1/3 to 1/2 of that a year ago. As based on the present outlook the coming season's runoff can be expected to be well below normal.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for
RIO GRANDE BASIN

March 1, 1946

PRECIPITATION DATA

WATERSHED	STATE	Precipitation October 1 to February 28	Departure from Normal	Precipitation February	Departure from Normal
		Inches	Inches	Inches	Inches
Canadian	New Mexico	1.15	-2.09	0.20	-0.28
Rio Grande	Colorado	2.60	-2.25	0.24	-0.35
Rio Grande (N)	New Mexico	2.95	-2.29	0.39	-0.71
Rio Grande (S)	New Mexico	2.10	-1.08	0.09	-0.44
Pecos	New Mexico	2.93	-0.72	0.12	-0.47

Precipitation was considerably below normal over the watersheds of the Pecos, Canadian and Rio Grande in Colorado and New Mexico during February. The deficiency in precipitation from October 1 to February 28 over the entire area has reached serious proportions.

SUMMARY OF MARCH 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth			Water Content			Number Courses in Average	Snow Density			1946 Water Content in percent of	
	Ten Year Avg.*	1945	1946	Ten Year Avg.*	1945	1946		Ten Year Avg.*	1945	1946	Ten Year Avg.*	1945
	In.	In.	In.	In.	In.	In.		Percent	Percent	Percent		
Rio Grande	29.4	33.7	13.3	7.7	8.8	3.3	23	26	26	25	43	38
Chama River	33.0	36.8	13.1	9.3	10.1	3.3	5	28	27	25	35	33
Pecos River	18.4	22.8	8.0	4.9	5.8	2.2	3	27	25	28	45	38
Canadian River	23.8	29.3	11.3	6.3	7.6	2.7	4	26	26	24	43	36

*Some for shorter periods.

RIO GRANDE WATERSHED

Summary of Federal and State Cooperative Snow Surveys

Issued March 11, 1946, at Fort Collins, Colo.

No.	Main Drainage and Snow Course	Local Drainage	Location			Elev.	National Forest	Mar. 1 Snow Cover Measurements					
			State	Locality	Description			Av. Snow Depth			Av. Water Content		
								Av.@	1945	1946	Av.@	1945	1946
								In.	In.	In.	In.	In.	In.
	RIO GRANDE												
26	Wolf Creek Pass	South Fork	Colo.	Wolf Cr. Pass	4-37N-2E	10000	Rio Grande	71.7	65.6	43.2	21.7	20.9	10.0
27	Upper Rio Grande	Rio Grande	"	RioGrande Res.	13-40N-4W	9350	" "	22.8	21.7	6.9	5.0	4.2	1.0
47	Silver Lakes	Alamosa R.	"	1mi.S.Silver L.	15-36N-5E	9600	" "	22.4	25.4	15.1	4.5	5.0	2.9
49	River Springs	Conejos R.	"	10mi.W.Mogote	25-33N-6E	9300	" "	26.1	28.2	15.2	6.3	6.1	3.4
74	LaVeta Pass #2	SanCristo Cr.	"	LaVeta Pass	22-28S-70W	9300	SanCristoGr	29.2	33.7	16.7	6.8	9.0	4.6
76	Summitville	Wightman Cr.	"	Summitville	30-37N-4E	11500	Rio Grande	57.6	58.2	32.4	15.2	13.5	7.6
77	Cumbres Pass #2	Los Pinos R.	"	Cumbres Pass	17-32N-5E	10000	" "	64.5	63.4	28.0	20.2	19.8	7.9
80	Santa Maria	N.Clear Cr.	"	Santa Maria Res.	8-41N-2W	9700	" "	17.1	16.3	T	3.6	3.1	T
82	Culebra	Culebra R.	"	12mi.E.SanLuis	37.2N105.2W	10000	SanCristoGr	33.4	44.1	16.1	8.7	11.2	4.3
84	Fort Garland	Big Ute Cr.	"	6mi.N.Ft.Garland	13-29N-72W	8200	" " "	14.6	20.9	0	1.9	5.3	0
1	Red River	Red River	N.Mex.	6mi.SE.RedRiver	29-28N-15E	9500	Carson	29.3	45.0	9.8	8.3	13.1	2.9
2	Taos Canyon	Rio de Taos	"	14mi.E.Taos	10-25N-15E	9000	"	20.8	28.9	8.4	6.1	8.8	2.4
4	Aspen Grove	Rio En Medio	"	10mi.NE.Santa Fe	12-18N-10E	9100	Santa Fe	20.3	24.2	10.2	5.0	5.2	2.7
5	Lee Ranch	Jemez Cr.	"	5mi.NW.Bland	3-18N-4E	9050	" "	28.3	30.6	12.2	7.0	7.0	2.8
6	Canjilon	Canjilon Cr.	"	8mi.NE.Canjilon	4-26N-6E	9500	Carson		--	34.4		--	13.8
9	Hematite Park*	Red River	"	3mi.SE.Red R.	8-28N-15E	9500	"	20.2	24.6	7.2	5.5	7.4	1.5
12	Tres Ritos	Agua Piedra	"	7mi.W.HolmanHill	23-22N-13E	9000	"	23.3	27.8	12.3	6.1	6.7	3.1
15	Pay Role	Spring Creek	"	6mi.SE.Hopewell	23-28N-7E	9700	"	32.5	39.6	17.6	7.9	9.5	4.3
16	Jicarilla	Rock Lake Cr.	"	15mi.S.Dulce	9-29N-1W	8500	JicarillaR.	16.3	26.2	3.3	3.8	3.7	0.7
17	Chama Divide	Willow Creek	"	6mi.W.Chama	36.9N-106.7W	7750	OffForest	19.0	19.9	5.0	5.4	6.3	0.9
18	Chamita	Chamita Cr.	"	6mi.NW.Chama	36.9N-106.7W	8500	" "	32.8	34.8	11.4	9.1	11.1	2.7
19	Cordova	Cordova Canyon	"	2mi.W.Tres Ritos	22-22N-13E	10100	Carson	38.5	52.7	20.6	9.9	13.1	5.3
20	Panchuela#2*	Rio Nambe	"	2mi.N.Cowles	27-19N-12E	8300	Santa Fe	14.4	16.0	3.5	3.8	4.2	0.9
21	Big Tesuque	Big Tesuque Cr.	"	10mi.NE.Santa Fe	17-18N-11E	10000	" "	20.5	28.2	10.4	6.0	8.1	3.1
							Average for drainage	29.4	33.7	13.3	7.7	8.8	3.3

*On adjacent drainage

@Average for period of record.

RIO GRANDE WATERSHED

Summary of Federal and State Cooperative Snow Surveys

Issued March 11, 1946, at Fort Collins Colo.

No.	Main Drainage and Snow Course	Local Drainage	Location: State	Locality	Description	Elev.	National Forest	Mar. 1 Snow Cover Measurements: Av. Snow Depth: Av.©	1945	1946	Av. Water Content: Av.©	1945	1946
								In.	In.	In.	In.	In.	In.
	CHAMA RIVER												
77	Cumbres Pass #2	Los PinosR.	Colo.	Cumbres Pass	17-32N-5E	10000	Rio Grande	64.5	63.4	28.0	20.2	19.8	7.9
6	Canjilon	Canjilon Cr.	N.Mex.	8mi.NE.Canjilon	4-26N-6E	9500	Carson		--			--	
15	Pay Role	Spring Creek	"	6mi.SE.Hopewell	23-28N-7E	9700	"	32.5	39.6	17.6	7.9	9.5	4.3
16	Jicarilla	Rock LakeCr.	"	15mi.S.Dulce	9-29N-1W	8500	Jicarilla R	16.3	26.2	3.3	3.8	3.7	0.7
17	Chama Divide	Willow Creek	"	6mi.W.Chama	36.9N-106.7W	7750	Off Forest	19.0	19.9	5.0	5.4	6.3	0.9
18	Chamita	Chamita Cr.	"	6mi.NW.Chama	36.9N-106.7W	8500	" "	32.8	34.8	11.4	9.1	11.1	2.7
					Average for Drainage			33.0	36.8	13.1	9.3	10.1	3.3
	PECOS RIVER												
4	Aspen Grove*	Holy Ghost Cr.	N.Mex.	10mi.NE.Santa Fe	12-18N-10E	9100	Santa Fe	20.3	24.2	10.2	5.0	5.2	2.7
20	Panchuela #2	Panchuela Cr.	"	2mi.N.Covles	27-19N-12E	8300	Santa Fe	14.4	16.0	3.5	3.8	4.2	0.9
21	Big Tesuque*	Holy Ghost Cr.	"	10mi.NE.Santa Fe	17-18N-11E	10000	Santa Fe	20.5	28.2	10.4	6.0	8.1	3.1
					Average for Drainage			18.4	22.8	8.0	4.9	5.8	2.2
	CANADIAN RIVER												
9	Hematite Park	Moreno Creek	N.Mex.	3mi.SE. Red R.	8-28N-15E	9500	Carson	20.2	24.6	7.2	5.5	7.4	1.5
10	Ocate Mesa	Ocate Creek	"	3mi.E.Black L.	25-24N-16E	9200	Off Forest	13.0	12.2	5.2	3.6	3.3	1.0
12	Tres Ritos*	Luna Creek	"	7mi.W.Holman Hill	23-22N-13E	9000	Carson	23.3	27.8	12.3	6.1	6.7	3.1
19	Cordova*	Luna Creek	"	2mi.W.Tres Ritos	22-22N-13E	10100	"	38.5	52.7	20.6	9.9	13.1	5.3
					Average for Drainage			23.8	29.3	11.3	6.3	7.6	2.7

*On adjacent drainage

©Average for period of record.

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE
- Colorado State Engineer
- Wyoming State Engineer
- Utah State Engineer
- New Mexico State Engineer
- Montana State Engineer
- Nebraska State Engineer
- Colorado Experiment Station
- Colorado Extension Service
- Montana Experiment Station
- Utah Experiment Station

FEDERAL
- Department of Agriculture
  - Forest Service
  - Soil Conservation Service
- Department of Interior
  - Bureau of Reclamation
  - Indian Service
  - Geological Survey
  - National Park Service
- Department of Commerce
  - Weather Bureau
- War Department
  - Army Engineer Corps

PUBLIC UTILITIES
- Colorado Public Service Company
- Western Colorado Power Company
- Montana Power Company
- Denver and Rio Grande Western R. R. Company

MUNICIPALITIES
- City of Bozeman
- City of Denver
- City of Boulder

WATER USERS ORGANIZATIONS
- Poudre Valley Water Users' Association
- Arkansas Valley Ditch Association
- Colorado River Water Conservation District

IRRIGATION PROJECTS
- Farmers Reservoir and Irrigation Company
- San Luis Valley Irrigation District
- Santa Maria Reservoir Company
- Costilla Land Company
- Uncompahgre Valley Water Users' Association
- Wyoming Development Company
- Goshen Irrigation District
- Kendrick Project
- Pathfinder Irrigation District
- Salt River Valley Water Users' Association
- San Carlos Irrigation and Drainage District

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